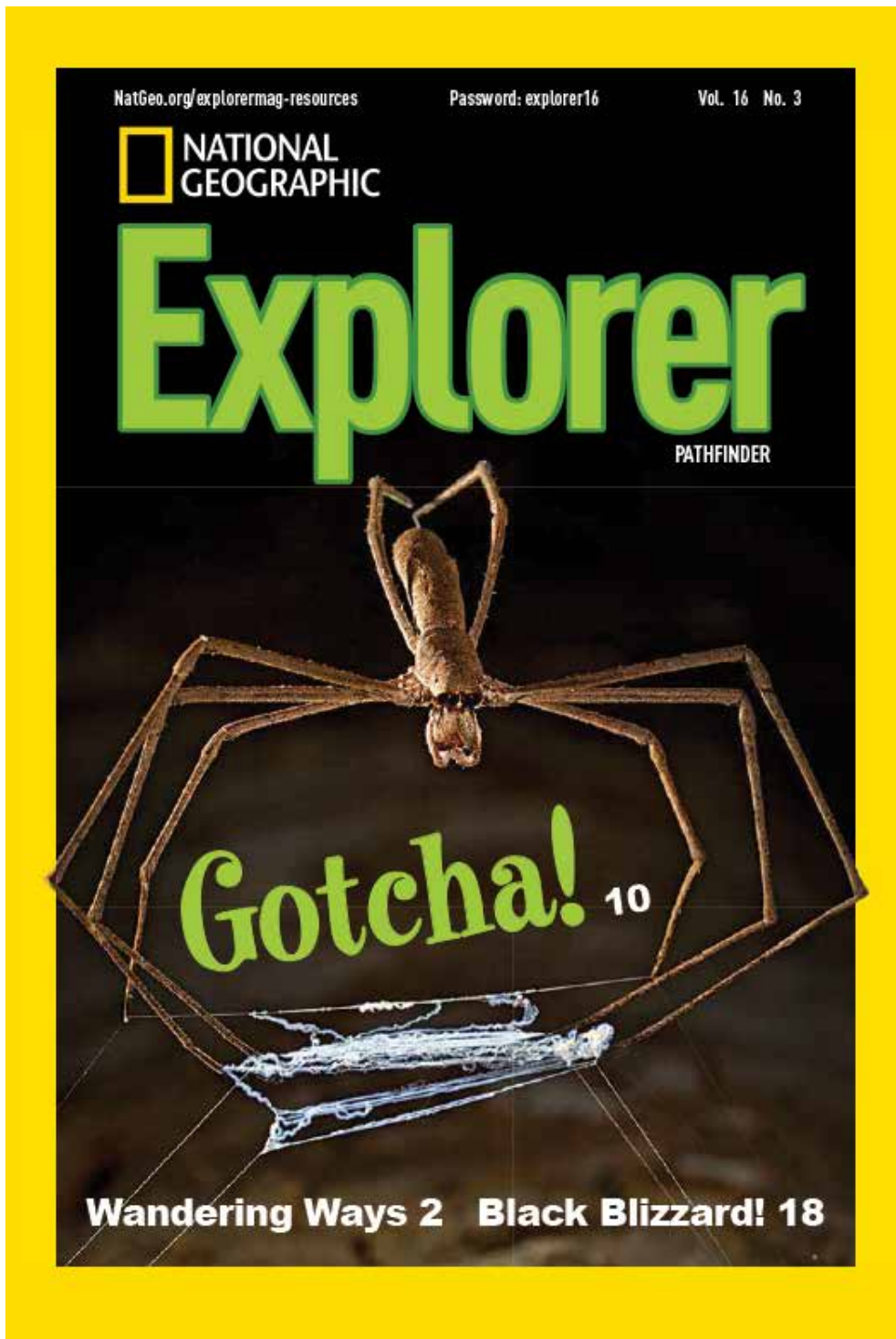


TEACHER'S GUIDE



Pathfinder

Vol. 16 No. 3

In This Guide

This guide contains language arts and science lessons for articles in this issue of EXPLORER PATHFINDER.

Explorer Magazine

EXPLORER classroom magazines are specifically written for each grade, 2-5. Through great storytelling and stunning photographs, the EXPLORER magazines develop literacy skills and teach standards-based science content.

The EXPLORER magazines strive to offer a variety of reading experiences for students with different ability levels in the same class. Thus, all articles have been measured using the Lexile® Framework for Reading. Some articles will be easier to read than others, but all articles in EXPLORER PATHFINDER will be within the 450-850L range.

EXPLORER is part of NATIONAL GEOGRAPHIC EXPLORER'S Education program. For more resources, visit the "For Teachers" tab on EXPLORER'S website, natgeo.org/explorermag-resources.

Your Subscription Includes:

- Magazines
- Classroom Posters
- Projectable Magazine
- Interactive Whiteboard Lesson
- Teacher's Guide
- App (additional subscription required)

Objectives

- Students will predict definitions and then write sentences to better understand unfamiliar words.
- Students will interpret and explain information visually, orally, and quantitatively to quickly answer questions about the text.

Resources

- Vocabulary Assessment Master (page 6)
- Language Arts Assessment Master (page 7)

Summary

- The article “Wandering Ways” introduces students to three nomadic tribes across the world and explores how they live.

BUILD VOCABULARY AND CONCEPTS

- **nomad**
- **trade**
- **tradition**

Give each student a copy of the **Vocabulary Assessment Master**. Point out to students that they may have heard some or all of these words before.

Using that background knowledge as a base, instruct students to predict and write a definition for each word. Then have them write a sentence using each word, based on the definitions they wrote.

Display the Wordwise feature on page 9 of the projectable magazine. Review the definitions as a class. Have students add these definitions to their worksheets. Instruct them to write new sentences, using each word as it is defined in the article.

Invite volunteers to read aloud the before and after sentences they wrote for each word. As a class, examine how new knowledge contributed to students' understanding of each word.

READ

Inform students that the purpose of this article is to introduce them to different nomadic cultures found across the world. Discuss what a nomadic culture is.

Display pages 2-3 of the projectable magazine. Tell students to look at the photo. **Say:** *When people read, they usually focus on the words. But photos can tell you a lot, too. For example, when I look at this photo, I know that this person lives in a desert. He uses camels to carry his things.* **Ask:** *What else can you learn by looking at the photo?* Encourage students to share their ideas.

Then pose one more question to the class. **Ask:** *Where do you think this person lives?* Invite volunteers to answer the question. Then zoom in on the map of Africa at the bottom of the page. Point out to the class that you might have been able to answer this question by reading the text. But that wasn't necessary in this case. All you had to do was look at the map. **Say:** *Many times, readers can get information from photos, captions, diagrams, and other text elements in an article. That information can quickly answer some of the questions they have.*

Give each student a copy of the **Language Arts Assessment Master**. Review the questions on the worksheet with the class. Then have students read the article on their own. As they do, instruct them to answer each question and find four facts about each tribe. Tell students to record where they found each answer or fact in the article.

Wandering Ways

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about nomads. **Ask:** *What is a nomad?* (a member of a group of people that has no permanent home and moves from place to place) *Why do the Wodaabe people move around?* (to find food and water for their cows) *At what time of year do they stop moving?* (during the rainy season) *Why?* (Water soaks the ground and grass grows. They don't need to move to find grass for their cows during the rainy season.) Invite students to share what else they learned about the nomads introduced in the article.

- **Predicting Definitions** Have students turn and talk to discuss what they learned about the three vocabulary words. Encourage them to compare their results in small groups. Instruct students to discuss how examining the information they collected impacted their understanding of each term.

- **Interpreting Information** After reading the article, remind students that articles contain much more than text. They often contain photos, diagrams, captions, and other text elements, too. These text elements usually highlight important points in the text. Because of that, readers can often find answers to questions more quickly if they study the text elements on the page. Have students share their **Language Arts Assessment Masters** in small groups. Instruct students to compare the answers they recorded for each question. If their answers differ, suggest that they revisit the text they elements identified as sources and reevaluate their responses. Then have them share the facts they collected. If any facts are questionable, instruct students to refer to the source to clarify the information.

WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *What do the Wodaabe do during the dry season? How do their lives change when it starts to rain?*
- *In what ways are the Tsaatan dependent upon reindeer for their survival?*
- *What surprised you about what you read?*

Wandering Ways

SOCIAL STUDIES

Objectives

- Students will compare and contrast three nomadic cultures.
- Students will understand that nomads live all over the world.

Resources

- Content Assessment Master (page 8)
- "Nomads" poster (Teacher's Edition)
- Comprehension Check (page 9)

Social Studies Background

They live in groups, moving from place to place in search of food and a temporary home. They take all that they own with them. They are nomads and this is their way of life.

Although it has become increasingly difficult to avoid modern infrastructure, many groups of nomads still exist. Some, like the Tuareg, live in deserts. The Tuareg live in the Sahara. Long ago, they were nomadic herders of camels, goats, and sheep. Now, they are well-known traders who travel in caravans across the desert.

The Wodaabe also live in the Sahara. These herders depend on cows for survival. During the dry season, they move around in search of grass for their cows to eat. During the rainy season, when grass is plentiful, the tribe reunites.

The Tsaatan are nomads that live in northern Mongolia. Each family keeps a small herd of reindeer, which is why the Tsaatan are also known as the Reindeer People. Reindeer take care of most of the Tsaatan's needs. To ensure that their reindeer have food, the Tsaatan move to new pastures every five weeks or so.

Not all nomads live on land. For nearly 4,000 years, the Moken have sailed around the islands off the east of Myanmar (Burma). These sea gypsies live on boats, hunting and gathering creatures from the ocean. During monsoon season, they transition to land to avoid the dangerous storms at sea.

ENGAGE

Tap Prior Knowledge

Instruct students to think about the last time they went outside and just wandered around. Invite volunteers to tell what they did. Now tell students to imagine that this was their normal life. They had no permanent home. There were no grocery stores to buy food. They constantly moved from place to place and had to take everything they owned with them. Would students like to live like this? Encourage them to share their opinions.

EXPLORE

Preview the Lesson

Display pages 2-3 of the projectable magazine. As a class, compare and contrast this person's life to what it's like where you live. Guide the class to understand that this person is a Tuareg, a type of nomad that lives in the Sahara in Africa. **Say:** *The Tuareg are nomads. Different groups of nomads live all over the world. Although nomads are always on the move, no two groups of nomads are exactly alike.* Tell students they will learn more about the similarities and differences among nomad groups as they read the article.

Set a Purpose and Read

Have students read the article in order to compare and contrast three nomadic cultures and understand that nomads live all over the world.

EXPLAIN

Compare and Contrast Cultures

As a class, review the images in the article. Invite students to describe the people they see in each photo. In small groups, have students discuss what life would be like in each nomadic culture. Give each student a copy of the **Content Assessment Master**. Encourage students to use information from the article and notes from their **Language Arts Assessment Masters** to compare and contrast the Wodaabe, Tsaatan, and Moken nomadic groups.

Wandering Ways

SOCIAL STUDIES

EXPLAIN

(continued)

Recognizing a World of Nomads

Display pages 2-3 of the projectable magazine.

Zoom in on the second paragraph of text and invite a volunteer to read that paragraph aloud. **Say:**

According to the text, at one time, many people lived as nomads. But the world changed. It's difficult—but not impossible—to roam free in the modern world.

Remind students that they read about three groups of nomads in the article. Inform them that other nomadic groups do exist. Display the **"Nomads" poster**. Zoom in on the photo and information related to the Inuit. Invite a volunteer to read the text aloud. Encourage students to share what else they know about the Inuit. Then locate where the Inuit live on the world map. As a class, discuss how this location and the climate found here could influence the way the Inuit live. Explore the remaining groups of nomads in this same way.

ELABORATE

Find Out More

Display the **"Nomads" poster**. Point out to the class that the three nomadic groups from the article are on the poster. There are also five other nomadic cultures. Divide the class into five groups. Assign each group one of these other cultures. Instruct students to conduct research to learn more about their assigned nomadic group. Invite groups to share what they learned with the class.

Extend Your Thinking About Nomads

Point out to students that even though nomads are constantly moving and have no permanent homes, nomadic cultures still have important traditions. The Wodaabe, for example, celebrate Gerewol for an entire week. Challenge students to identify other traditions mentioned in the article. Discuss how these traditions help the groups survive in the modern world.

EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is a tradition?* (a belief or way of doing something that is passed from one generation to the next)
- *How does weather force the Moken people to live on land part of the year?* (At certain times of the year, big storms can bring heavy winds and rain. During that time, it's safer to live on land.)
- *How are the Wodaabe and Tsaatan people alike?* (Both move around so their animals can find food and water.) *How are they different?* (The Wodaabe herd cows. The Tsaatan herd reindeer.)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

Name _____

Date _____

VOCABULARY ASSESSMENT : Wandering Ways

Use this organizer to study each vocabulary word in the article.

Word			
Predicted Definition			
Sentence			
Definition from the Article			
Sentence			

LANGUAGE ARTS ASSESSMENT: Wandering Ways

Answer questions and record facts about nomadic cultures.

	Wodaabe	Tsaatan	Moken
Where do they live?			
What is it like there?			
Why do they move?			
List four other facts you learned about each tribe.			

Name _____

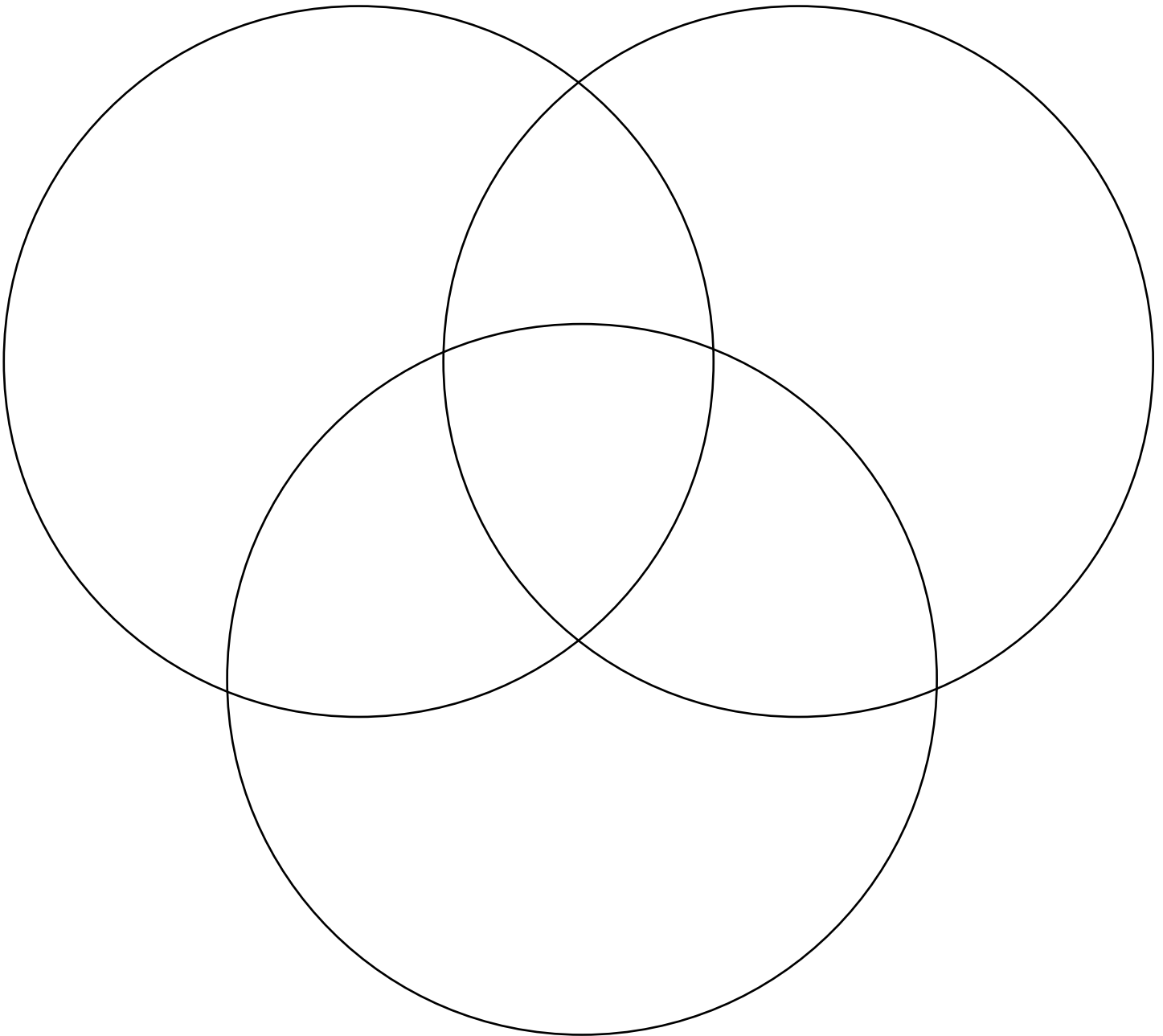
Date _____

CONTENT ASSESSMENT: Wandering Ways

Use this diagram to compare and contrast the three nomadic cultures in the article.

Culture: _____

Culture: _____



Culture: _____

COMPREHENSION CHECK: Wandering Ways

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. During which season do the Wodaabe gather in groups?

- Ⓐ the dry season
- Ⓑ the rainy season
- Ⓒ the snowy season

2. What are the Moken most likely to eat?

- Ⓐ cheese
- Ⓑ fish
- Ⓒ yogurt

3. What is it like where the Tsaatan live?

- Ⓐ hot and dry
- Ⓑ warm and rainy
- Ⓒ cold and snowy

4. Which nomadic group lives in Africa?

- Ⓐ Moken
- Ⓑ Tsaatan
- Ⓒ Wodaabe

5. Pick two groups from the article. Tell one way they are alike and one way they're different.

Objectives

- Students will explore the meaning of vocabulary words in a variety of different ways.
- Students will use information in the article to explain the processes unusual predators use to catch prey.

Resources

- Vocabulary Assessment Master (page 14)
- Language Arts Assessment Master (page 15)

Summary

- The article “Gotcha!” introduces students to six predators and outlines the unusual methods they use to catch their prey.

BUILD VOCABULARY AND CONCEPTS

- **bioluminescence**
- **predator**
- **prey**

Read aloud each of the vocabulary words. As you do, poll the class to see how many students are familiar with each word. Then challenge volunteers to provide a scientific definition of each term.

Point out that this task was most likely easier with some of the words than others. **Say:** *As students, your vocabulary is constantly expanding. But many of the words you learn have multiple meanings. When reading about science, it's important to understand the scientific definition. And a great way to remember that more technical definition is to study the word in multiple ways.*

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to use this worksheet to explore the vocabulary words in four different ways: writing definitions, restating the definition in their own words, using the term in a sentence, and then drawing a picture to help them remember what the word means.

READ

Inform students that the purpose of this article is to introduce readers to six predators and explain the unusual methods they use to catch prey.

Tell students that hunting for prey is a process.

Say: *To understand how a process works, you just have to follow the steps. The tricky part is to read closely enough that you find all of the steps. If you skip something important, what you're reading may not make much sense.*

Display pages 10-11 of the projectable magazine. Invite a volunteer to read aloud the headline and text. Challenge students to identify two of the surprising predators introduced in the article. (net-wielding spiders, spitting fish) Brainstorm ideas about how animals like these might be able to catch their prey.

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article on their own. As they do, instruct them select three predators from the article. Tell students to draw a picture that shows how the predator catches prey. Then have them explain the process each predator uses in four simple steps.

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about unusual predators. **Ask:** *What is a predator?* (an animal that kills and eats other animals) *What unusual method does a peacock mantis shrimp use to catch prey?* (It punches prey with its front limbs.) *How does an archerfish catch its prey?* (It spits a stream of water on it.)

- **Exploring Meanings** Inform students that it's essential for readers to understand the technical definition of words when reading about science. Without that knowledge, it's very difficult to understand the text. **Say:** *Once you do understand what scientific terms mean, not only can you follow along with the text but you can use the words correctly in new sentences of your own.* Challenge students to make accurate statements using each of the vocabulary words. Encourage them to use their **Vocabulary Assessment Masters** as resources. But remind them to be original. Students shouldn't restate sentences from the article. They should create new sentences of their own.

- **Explaining Processes** After reading the article, remind students that explaining processes is a strategy that people use to better understand what they're reading. Point out all the information they need can be found in order as they read the text. Have students share their **Language Arts Assessment Masters** in small groups. Instruct students to compare the steps they recorded. Then have them analyze how the pictures they drew help them understand each process.

WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *How does a netcasting spider catch prey?*
- *How do humpback whales catch prey with bubbles?*
- *What surprised you about what you read?*

SCIENCE

Objectives

- Students will understand that some animals have special features or skills that help them hunt prey.
- Students will recognize that predators live in all types of environments.

Resources

- Content Assessment Master (page 16)
- "Creative Carnivores" poster (Teacher's Edition)
- Comprehension Check (page 17)
- "Gotcha!" Interactive Whiteboard (optional)

Science Background

All animals need food to live. Some animals get their food by eating other animals. They are predators, and the food they eat is their prey.

Predators use a variety of techniques to capture prey. Some are simply faster or stronger than the animals they pursue. Others utilize unique body parts or interesting techniques.

For example, the margay cat attracts monkeys with its voice. Its call sounds just like a baby monkey. The peacock mantis shrimp packs a strong punch. It can take down prey twice its size. Netcasting spiders spin and throw nets. And the archerfish spits a strong stream of water to knock prey off of branches into the water.

Many predators act alone. But some attack as a team. And even as a team, unique parts or unusual techniques can give predators an edge over their prey.

Glowworms, for example, have a bioluminescent shine. When hundreds of glowworms shine from the roof of a cave, they resemble a starry night. Unsuspecting insects, attracted by the light, fly straight into their sticky snares.

Humpback whales work together, too. They blow bubbles. The bubbles cause fish to rise and pack together into a tight ball. With one gulp, a whale can capture thousands of fish.

ENGAGE

Tap Prior Knowledge

Prior to conducting this activity, download images of several common predators, such as a lion, snake, eagle, or shark. As you display each photo for the class, have students identify the predator and its likely prey. Challenge students to explain how each predator hunts for prey.

EXPLORE

Preview the Lesson

Display pages 10-11 of the projectable magazine. Have students examine the animal in the photo. Inform the class that this photo shows a peacock mantis shrimp. Point out that the text says the animals in this article are all predators with amazing and unexpected hunting techniques. Brainstorm ideas about how this shrimp might catch its food.

Set a Purpose and Read

Have students read the article in order to understand that some animals have special features that help them hunt prey and that predators live in all types of environments.

EXPLAIN

Recognizing Special Features and Skills

After students read the article, display pages 12-13 of the projectable magazine. Highlight the subhead "Killer Mimic." Discuss reasons why this subhead is a good description of the special part or skill that a margay cat uses to catch prey. (The cat's voice mimics the sound of baby monkeys. This gets the attention of adults and draws them toward the cat.) Give each student a copy of the **Content Assessment Master**. With a partner, instruct students to record the article's subheads. If two subheads relate to the same animal, have students write them in the same box. Tell students to identify the animal featured in each section and the special part or skill it uses to catch prey. Challenge students to explain why each example is an unusual hunting technique.

SCIENCE

EXPLAIN

(continued)

Introducing More Creative Carnivores

Display the "**Creative Carnivores**" poster. Discuss reasons why the poster's headline is appropriate for this topic. (Animals that hunt and eat other animals are carnivores. This article is about predators that hunt in unusual ways.) Invite volunteers to read aloud the information about each animal. Discuss how each carnivore hunts for food. Compare and contrast each one with the examples presented in the article.

Exploring a World of Innovative Predators

Instruct students to examine the article's photos in their student magazines. Tell them to focus on the background of each photo rather than the featured predator. **Ask:** *What do you notice?* Guide students to recognize that these predators live in a variety of different environments. Some live on land. Others live in water. Review the article for more details about where each predator lives. Have students study the animals on the "**Creative Carnivores**" poster, too. If necessary, have students conduct research to learn more about where each predators lives.

ELABORATE

Find Out More

Inform students that between the article and the "**Creative Carnivores**" poster, they learned about 10 predators that use unusual body parts or unexpected techniques when they hunt for prey. Divide the class into small groups. Instruct groups to conduct research to identify and learn about three more innovative predators. Invite groups to present what they learned to the class.

Extend Your Thinking About Predators

Remind students that the article told readers what unusual predators did to catch prey. But it didn't explain why. As a class, brainstorm reasons why each of these predators might have developed these unusual adaptations or techniques.

EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is bioluminescence?* (light produced by a chemical reaction in a living organism)
- *Which predator in the article uses bioluminescence to catch prey?* (glowworm)
- *Why does bioluminescence help this predator catch prey where it lives?* (Glowworms live in caves. It's dark inside caves. When they glow, insects fly toward them.)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article. You may also wish to examine the optional **Interactive Whiteboard** lesson that accompanies this article.

VOCABULARY ASSESSMENT: Gotcha!

Use this organizer to examine each vocabulary word.

Write the definition.	What is the word?	Restate in your own words.
Draw a picture.		Use the term in a sentence.

Write the definition.	What is the word?	Restate in your own words.
Draw a picture.		Use the term in a sentence.

Write the definition.	What is the word?	Restate in your own words.
Draw a picture.		Use the term in a sentence.

LANGUAGE ARTS ASSESSMENT: Gotcha!

Identify three animals in the article. Draw a picture to show how each predator catches its prey. Explain what happens during each attack.

Identify	Draw	Summarize
		1. 2. 3. 4.
		1. 2. 3. 4.
		1. 2. 3. 4.

Name _____

Date _____

CONTENT ASSESSMENT: Gotcha!

Use this organizer to explore the unusual hunting techniques of each predator.

Animal and Subhead(s)	Animal	Part or Skill	Why is this unusual?

COMPREHENSION CHECK: Gotcha!

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. What does a margay cat do to catch prey?
 A copy
 B punch
 C spit
2. Which predator drops something on its prey?
 A archerfish
 B humpback whale
 C netcasting spider
3. How are the glowworm and the margay cat alike?
 A Both live in Australia.
 B Both attract prey to them.
 C Both live in caves.
4. What technique does a humpback whale use to catch prey?
 A hide, approach, punch
 B wait, spit, hit
 C blow, rise, launch
5. Pick one predator from the article or poster. Describe its unexpected hunting technique.

Black Blizzard!

LANGUAGE ARTS 710L

Objectives

- Students will assess their familiarity with and knowledge of vocabulary words.
- Students will use details and examples to make inferences.
- Students will explain concepts based on information in the text.

Resources

- Vocabulary Assessment Master (page 22)
- Language Arts Assessment Master (page 23)

Summary

- The article “Black Blizzard!” uses specific examples to introduce readers to the phenomenon of dust storms. As they read, students will examine the science behind and impact of dust storms around the globe.

BUILD VOCABULARY AND CONCEPTS

- **agriculture**
- **dust**
- **haboob**
- **soil**

As a class, discuss the difference between familiarity and knowledge. Guide students to recognize that the more familiar you are with something, the more knowledge you have. Challenge students to explain how this concept applies to words when they read.

Display the vocabulary words on a word wall or on the whiteboard. Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to write each word on their papers. Review the categories under the header “Familiarity with the Word.” Tell students to make a checkmark to indicate how well they know each word.

Instruct students to write what they think each word means on their worksheets. Then display the Wordwise feature on page 23 of the projectable magazine. Have students write those definitions on their worksheets and compare them with the definitions they wrote.

READ

Let students know that the purpose of this article is to introduce them to dust storms. As they read, they will examine the science behind and impact of dust storms around the world.

Inform students that sometimes that as they read, they will find examples where the writer says exactly what she means. But other times, the writer gives clues. It is up to the reader to interpret and connect those clues and then come to a logical conclusion, or inference.

Display pages 18-19 of the projectable magazine. Read aloud the headline. Model how to make an inference. **Say:** *There are two words in this headline: black and blizzard. Only one of those words seems to make sense. I know that a blizzard is a storm with strong winds. When I look at this photo, I can see that this man’s hat is flying away. I can infer that the wind is blowing pretty hard here. This is a type of blizzard.* Point out, however, that blizzards usually occur in winter when there’s lots of snow. There is no snow in this photo. And the man isn’t dressed for cold temperatures. **Ask:** *What is a black blizzard?* **Say:** *To figure this out, I need to look for more clues. I can see dark clouds in this photo. I also notice that the ground is bare and dry. Dry ground creates dust. My guess is that dirt is blowing around in those clouds. A black blizzard must be a giant dust storm. To know for sure, I’ll need to read the article.*

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article on their own. As they do, instruct them to record three questions they have about the text. Challenge them to find clues in the photos and text that help answer each question. Then have them write what they already know about each subject. Challenge students to make logical inferences based on the information they have recorded.

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about dust storms. **Ask:** *What is dust?* (dry powder consisting of tiny particles of earth) *What besides dust flies around during a dust storm?* (sand and soil) *What caused the Dust Bowl in the 1930s?* (It didn't rain for years. No crops grew, so the dry soil was blown into the air.) Encourage students to share other facts they learned about dust storms.

- **Make Inferences** Remind students that an inference isn't a wild guess. It's a logical conclusion based on information in the text. **Say:** *Writers want readers to understand any inferences they make, so they try to leave a clear path of clues for readers to follow.* Have students share their **Language Arts Assessment Masters** with a partner. Did students investigate the same questions? Did they make the same inferences? Have students share the clues they found with their partners. Challenge them to explain how the clues and what they already knew led them to each logical conclusion.

- **Explain Concepts** After reading the article, **say:** *One way to see if you understand information is to try to tell someone else about the topic. If you can't explain the concept, you might need to read the article again.* Have students turn and talk to explain to a partner why people think an ancient dust storm buried 50,000 soldiers in the Sahara. Prompt discussion with questions.

WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *What is it like during a dust storm?*
- *How can dust storms impact the areas where they occur? How can they impact areas far away?*
- *What surprised you about what you read?*

Black Blizzard!

SCIENCE

Objectives

- Students will understand what a dust storm is.
- Students will recognize how dust storms can change the landscape.

Resources

- Content Assessment Master (page 24)
- Comprehension Check (page 25)

Science Background

Dust is a fine, dry powder consisting of tiny particles of earth. It is heavy enough to see and light enough to be carried by wind. And if enough dust is available, it can contribute to a storm that reaches thousands of meters high.

A dust storm can form over any dry region of Earth. This includes deserts, dried up lake beds, and even farmland or pastureland that has become exposed and dry.

As wind blows across areas like these, dust clouds begin to form. Particles of dust and sand bounce off each other. This keeps the particles aloft. If they happen to become caught in a thunderstorm, a violent dust storm called a haboob can occur.

Dust storms happen all over the world. Their effects can be harmful to people, who find it difficult to see or breathe.

They can also be harmful to the areas where they occur. In 1983, a dust storm struck Melbourne, Australia. In the end, the storm dumped more than 1,000 tons of dust on the city. It took many years and millions of dollars to repair the damage.

On the other hand, this dust may also settle in open farmland areas. Over time, those deposits of dust can develop into fertile soil where many crops can grow.

ENGAGE

Tap Prior Knowledge

Give each student a piece of plain white paper. Now inform them that they have 10 seconds to draw a picture of a black blizzard. When time is up, examine the results. How many students drew something resembling a dark, fat tornado? As a class, discuss what could have caused this storm to be black. Discuss reasons why it would be swirling.

EXPLORE

Preview the Lesson

Display pages 18-19 of the projectable magazine. As students examine the image, read aloud the headline and subhead. Invite students to share their opinions about what happens when fine dust, soil, and sand are captured by a turbulent wind. Encourage them to search for clues in the photo.

Set a Purpose and Read

Have students read the article in order to understand what a dust storm is and to recognize how dust storms can change the landscape.

EXPLAIN

Understanding Dust Storms

Assign each student a partner. Give pairs five minutes to examine the article's photos. Based on what they see, challenge each pair to write a succinct definition of a dust storm. Reunite as a class to share and compare the results. Guide the class to understand that a dust storm is a dangerous event in which clouds of dust and sand churn across Earth's dry regions. These storms can suddenly strike with little warning. A dust storm may rise thousands of meters high. Have students rejoin their partners. Give each student a copy of the **Content Assessment Master**. Instruct pairs to review the article for details that explain what causes a dust storm to occur.

Black Blizzard!

SCIENCE

EXPLAIN

(continued)

Recognizing How Dust Storms Change the Land

Remind students that dust storms are turbulent winds that capture fine dust, soil, and sand and move it around. **Say:** *All of those particles came from somewhere. And when those winds stop, all of that dust, soil, and sand has to go someplace new.* As a class, discuss how this could change the land. Then divide the class into small groups. Assign each group one section of the article. Instruct groups to reread their assigned sections to note how a dust storm changed the land. Instruct students to add this information to the bottom of their **Content Assessment Masters**.

ELABORATE

Find Out More

Remind students that a haboob is a violent dust storm or sandstorm. Inform the class that although the word *haboob* has Arabic origins, storms like these develop in many parts of the world. With a partner, have students conduct research to learn more about haboobs. Invite students to share what they learned in small groups.

Extend Your Thinking About Dust Storms

Inform students that dust storms are not to be taken lightly. One immediate concern is people's health. But there are long-term effects, too. Clean-up costs can be astronomical. As a class, brainstorm a list of short-term and long-term effects. Challenge students to identify any benefits that might arise in the aftermath of a dust storm. (After the dust settles, it can turn into a rich soil where plants can grow.)

EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *Which type of dust storm is especially violent?* (haboob)
- *What causes lightning to occur inside a dust storm?* (Dust particles rub together.)
- *Where do dust storms occur?* (across Earth's dry regions)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

Name _____

Date _____

VOCABULARY ASSESSMENT: Black Blizzard!

Record information from the article about each vocabulary word.

Word	Familiarity with the Word			Knowledge of the Word	
	I know the word very well.	I've seen or heard the word before.	I don't know the word.	What I think the word means:	How the article defines the word:

Name _____

Date _____

LANGUAGE ARTS ASSESSMENT : Black Blizzard!

Use this organizer to make three inferences about black blizzards.

Questions I Have	Clues I Found	What I Know	What I Infer

CONTENT ASSESSMENT: Black Blizzard!

Explain what happens when a dust storm occurs. Summarize how a dust storm can change the land.

First:

Next:

Then:

Finally:

Summary:

COMPREHENSION CHECK: Black Blizzard!

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. What are the ingredients of a dust storm?

- Ⓐ water, soil, and wind
- Ⓑ dust or sand, soil, and wind
- Ⓒ water, dust or sand, soil

2. What kind of soil makes it easy for a dust storm to form?

- Ⓐ wet, heavy soil
- Ⓑ exposed, dry soil
- Ⓒ soil where many plants grow

3. Which word best describes a haboob?

- Ⓐ small
- Ⓑ quiet
- Ⓒ violent

4. How far can the dust in a sand storm travel?

- Ⓐ just a few kilometers
- Ⓑ up to 100 kilometers
- Ⓒ thousands of kilometers

5. What causes a dust storm to turn into a haboob?

ANSWER KEY

Wandering Ways

Assess Vocabulary, page 6

Students' predictions and the sentences they write will vary. They should record the words and definitions from the Wordwise feature on page 9.

nomad: a member of a group of people that has no permanent home and moves from place to place

trade: to exchange one thing for another

tradition: a belief or way of doing something that is passed from one generation to the next

Sentences will vary depending on the connections students identify.

Assess Language Arts, page 7

Possible responses include:

Wodaabe: Sahara; hot desert with dry and rainy seasons; to find grass and water for their cows

Tsaatan: northern Mongolia; high, windswept plains and dark forests, snowy; to find food for their reindeer

Moken: around the 800 islands off the coast of Myanmar (formerly called Burma); warm ocean, big storms can bring heavy winds and rain at certain times of year; to avoid the big storms

Facts will vary but should come from the article.

Assess Content, page 8

Answers will vary depending on which details students choose to compare. However, students should note that all three groups are nomads.

Comprehension Check, page 9

1. B; 2. B; 3. C; 4: C; 5: Answers will vary depending on which two groups students choose to compare.

Gotcha!

Assess Vocabulary, page 14

Students should record the words and definitions from the Wordwise feature on page 17.

bioluminescence: light produced by a chemical reaction in a living organism

predator: an animal that kills and eats other animals

prey: an animal hunted or caught by another for food

Students should restate each definition in their own words. Sentences and drawings will vary but should accurately reflect the meaning of each word.

Assess Language Arts, page 15

Answers will vary depending on which animals students choose.

Assess Content page, 16

Possible responses include:

Killer Mimic/margay cat/voice/The cat's voice sounds like a baby monkey.

Knock Out!/peacock mantis shrimp/punches prey with front limbs/The punch is so hard that this shrimp can take down prey twice its size.

Nothing But Net; In for the Kill/netcasting spider/net/Many spiders spin webs, but this one spins and throws a net.

Super Soaker; Sure Shot/archerfish/spits a stream of water/This skill allows the archerfish, which lives on water, to capture prey that lives on land.

Glow with the Flow/glowworm/bioluminescence/The bluish glow causes insects to fly toward the glowworm, making it easy for glowworms to snag prey in their sticky snares.

Bubble Bath/humpback whale/blows bubbles from blowhole/The bubbles cause fish to rise and bunch together. This makes it easy for the whales to gulp down thousands of fish at once.

Comprehension Check, page 17

1. A; 2. C; 3. B; 4: C; 5: Answers will vary depending on which predator students select.

Pathfinder

ANSWER KEY

(continued)

Black Blizzard!

Assess Vocabulary, page 22

Students should record the vocabulary words from the Wordwise feature on page 23, make checkmarks to show how familiar they are with each word, and write definitions in their own words. Then they should record the definitions from the article.

agriculture: the raising of crops and animals

dust: fine, dry powder consisting of tiny particles of earth

haboob: a violent dust storm or sandstorm

soil: the top layer of earth in which plants grow

Assess Language Arts, page 23

Students' questions will vary but all clues should come directly from text and photos in the article. Evaluate students' inferences to ensure that they are logical conclusions based on information in the text and student's prior knowledge of dust storms.

Assess Content, page 24

Students should outline a sequence of events explaining how a dust storm forms. They may choose to outline details in different ways. They should summarize what they learned about how a dust storm can change the land.

Comprehension Check, page 25

1. B; 2. B; 3. C; 4. C; 5: Dust is caught in the air currents of a thunderstorm.